Practical Approaches that Work

Waste Assessments
Tracking and Measurement

Diana P. Joyner, Environmental Engineer
March 22nd, 2016
Approach

- Waste Generation Evaluation
  - Plant Historical Records
  - Dumpster Dive - Entire Site & By Area
  - Target Materials
  - Target Areas

- Area Waste Assessments
  - Employee & Management Partnerships
  - Employee Communication / Education

- Tracking / Measurement
  - Reassess
Westinghouse, Columbia Fuel Fabrication
Solid Waste Generation Rates (FY)

- **2008**: 50 tons / month
- **2013**: 25 tons / month
- **2014**: 17 tons / month
- **2015**: 13.3 tons / month

Ultimate Goal = 0
What Does Your Company Throw Away?

CFFF Site Dumpster Dive March 2015

CFFF Site "Dumpster Dive" March 2015

Where should the Site’s Focus Be?

- Food Waste
- Paper Towels
- Trash Bags
Waste Reduction Opportunities

Food Scrap Collection

- Food Scraps

Food Digester

OR

- Food Composter

0 Food Waste to Landfill

&

27% reduction in Westinghouse Non-Manufacturing Waste
Waste Assessments
Waste Assessment

Benefits

• **In-depth understanding of waste generation for source targeting**

• **Area Focus** (aka “Buy In”) to the site’s larger goal of ZWTL

• **Feedback** for site sustainability team on what is and is not working
Waste Assessment Basics

- **Count** Receptacles
- **Describe the Location**
  - When possible, take pictures
- **Assess** Receptacles for:
  - Proximity to generation
  - Size / Capacity
  - Usage
    - at the end of the shift/day
  - Contents
    - Currently Recyclable?
    - Potentially Recyclable?
    - Truly Landfill?
Waste Assessments

Area: CFFF Tool Room
Waste Assessment

Area Focus: CFFF Tool Room
Waste Assessment
Area Focus: CFFF Tool Room

• **20 Trash Receptacles**
  – 11 rigid receptacles
  – 9 portable carts
    • Both used 56-gal capacity bags

• **Area Assessment**
  – Recyclable items were being thrown away because recycling receptacles were not easily accessible
  – Too many trash receptacles for the work space
  – Emptied too frequently
  – Oversized receptacles
Waste Assessment

Area Focus: CFFF Tool Room

Path Forward

• **Area Buy-In**
  – Area managers and workers agreed they did not need 20 receptacles

• **Receptacle Reduction**
  – Reduced by half, with primary decision to use portable carts
  – Recycling receptacles added where needed

• **Can Liner Reduction** by half

• **Service Frequency**
  – Discussions initiated with janitorial staff not to remove bags less than half full
Waste Assessments

Receptacle: CFFF Tube Prep
A picture is worth 1000 words
Waste Assessment
Receptacle: CFFF Tube Prep

What recycling programs were implemented at the time?

Before

After
Waste Assessment
Employee Education & Communication

Plastic Film
Glove Receptacles
Waste Assessments

**Receptacle:** CFFF Break Room 301/302
Waste Assessment
Receptacle: Break Room by 301/302

Opportunity:
• Trash cans located near exit
• Simple location of bin did not encourage recycling

Solution:
• Reorganized room to co-locate trash and recycling receptacles
• Improved communication signs
Waste Assessment
Employee Education & Communication

3-Dimensional Signs Created
Waste Assessment

Employee Education & Communication

NO
- Cups
- Napkins
- Paper Towels

YES

MIXED PAPER

EMPTY ALL CONTAINERS AS PRACTICABLE

PLASTICS, RIGID #1-7
Tracking and Measurement
Tracking and Measurement

Why measure and track solid waste?

- To set goals and/or meet company requirements
- Understand your waste stream
- Identify Improvement Opportunities
- Cost accounting
- To establish a baseline
Establish a Baseline

- Create a **spreadsheet** / use a company template
- **Compile** several years of waste generation data
  - Note any anomalies or changes that could skew the data:
    - Production
    - Headcount
    - Construction activities, etc.
- **Select** representative baseline measurement term, usually a calendar year or fiscal year
Tracking and Measurement
Waste Generation Data Collection

<table>
<thead>
<tr>
<th>Date</th>
<th>Weight (lb)</th>
<th># Flanders boxes sent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec-14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/28/2015</td>
<td>339</td>
<td>8</td>
</tr>
<tr>
<td>5/7/2015</td>
<td>405</td>
<td>8</td>
</tr>
<tr>
<td>7/27/2015</td>
<td>442</td>
<td>8</td>
</tr>
<tr>
<td>10/1/2015</td>
<td>540</td>
<td>8</td>
</tr>
<tr>
<td>12/16/2015</td>
<td>517</td>
<td>7</td>
</tr>
<tr>
<td>2/22/2016</td>
<td>592</td>
<td>7</td>
</tr>
</tbody>
</table>

Nitrile Gloves Recycled

2,835 lb Recycled (since beginning)
### Tracking and Measurement

#### Set Goals and Track Them

**PLEASE SUBMIT YOUR SUPPORTING DATA FILE; IN THIS FORMAT OR HOWEVER YOU TRACK THE CATEGORIZATION OF SEGREGATED STREAMS**

Westinghouse Electric Company LLC  
Baseline Environmental Performance Indicators  
Period: FY15  
Waste data collection for Major facilities

<table>
<thead>
<tr>
<th>Location name:</th>
<th>Columbia</th>
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#### Waste Generation and Disposition Data

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Waste Plastics</td>
<td></td>
<td>pounds</td>
<td>5220</td>
<td>2580.0</td>
<td>4380</td>
<td>2020</td>
<td>3220</td>
<td>5860</td>
<td>5380</td>
<td>6020</td>
<td>3800</td>
<td>1620</td>
<td></td>
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<tr>
<td>Waste Tires</td>
<td></td>
<td>pounds</td>
<td></td>
<td></td>
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<tr>
<td>Plastics</td>
<td></td>
<td>pounds</td>
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**Conversion:**  
- 1 ton = 2000 pounds

**Total Waste: 907.19 tons**

- **Logsdoc:**  
  - 940 lbs mixed paper  
  - 4200 lbs shred paper  

**Wood Scrap**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Wood waste (broken, dirty pallets)</td>
<td></td>
<td>tons (short tons)</td>
<td>3.73</td>
<td>3.49</td>
<td>3.36</td>
<td>2.44</td>
<td>2.52</td>
<td>3.05</td>
<td>5.43</td>
<td>1.99</td>
<td>3.69</td>
<td>4.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood waste</td>
<td></td>
<td>tons (short tons)</td>
<td></td>
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</tbody>
</table>

**Total Wood Scrap: 907.19 tons**
This sheet is now MANDATORY. However, you may include this information as a separate attachment if you wish.

Period: FY15

<table>
<thead>
<tr>
<th>Waste Generation and Disposition Data</th>
<th>Units for Toshiba category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Plastics</td>
<td>kg</td>
</tr>
<tr>
<td>Waste Tires</td>
<td>kg</td>
</tr>
<tr>
<td>Plastic</td>
<td>kg</td>
</tr>
<tr>
<td>Waste Paper (including general waste)</td>
<td>kg</td>
</tr>
<tr>
<td>Solid waste (generated and not segregated; Municipal solid waste)</td>
<td>kg</td>
</tr>
<tr>
<td>Paper</td>
<td>kg</td>
</tr>
<tr>
<td>Corrugated cardboard</td>
<td>kg</td>
</tr>
<tr>
<td>Wood scrap</td>
<td>kg</td>
</tr>
</tbody>
</table>

Recycled categories:
- = recycled no revenue
= recycled with revenue
= incinerated or otherwise combusted
= recycled onsite
Tracking and Measurement Rates

- **Waste to Landfill (WTL) / Final Disposal Rate (FDR)**

  \[
  \text{Ratio} = \frac{\text{total waste sent to landfill}}{\text{total waste}}
  \]

  \[
  \text{Percent} = \frac{\text{total waste sent to landfill}}{\text{total waste}} \times 100\%
  \]

- **Diversion Rate**

  percentage of waste materials diverted from traditional disposal such as landfilling or incineration to be recycled, composted, re-used, waste to energy, or otherwise kept from going to a landfill

  \[
  \text{Ratio} = \frac{\text{total materials recycled, composted, reused, etc}}{\text{total waste}}
  \]

  \[
  \text{Percent} = \frac{\text{total materials recycled, composted, reused, etc}}{\text{total waste}} \times 100\%
  \]

ZWTL = 100% Diversion Rate
• **Waste to Landfill (WTL) / Final Disposal Rate (FDR)**

\[
\text{Ratio} = \frac{\text{total waste sent to landfill}}{\text{total waste}}
\]

\[
\text{Percent} = \frac{\text{total waste sent to landfill}}{\text{total waste}} \times 100\% = \frac{17,119 \, \text{kg}}{146,317 \, \text{kg}} \times 100\% = 11.7\%
\]

• **Diversion Rate**

- percentage of waste materials diverted from traditional disposal such as landfilling or incineration to be recycled, composted, re-used, waste to energy, or otherwise kept from going to a landfill

\[
\text{Ratio} = \frac{\text{total materials recycled, composted, reused, etc}}{\text{total waste}}
\]

\[
\text{Percent} = \frac{\text{total materials recycled, composted, reused, etc}}{\text{total waste}} \times 100\% = \frac{129,198 \, \text{kg}}{146,317 \, \text{kg}} \times 100\% = 88.3\%
\]
FDR has decreased overall and will continue. Changes to CFFF sludge prediction methodology caused a setback in FY15.
Tracking and Measurement Benchmarking

- WTL / FDR
- Diversion Rate
- Per capita
  (generation and reduction)
- Normalization with production metric
- Cost
  (including source reduction and other avoided costs)
Reassess
Reassess

Area Focus: Component Area

Component Area Dumpster Dive 6-15-2015

- Nitrile Gloves: 3%
- Plastic Film: 3%
- Plastic #1-7: 3%
- Mixed paper: 6%
- Wood: 4%
- Metal bits: 2%
- Cardboard: 2%
- Nylon Gloves: 14%
- Paper towels (including pink): 9%
- Plastic bags (from collection cans): 4%
- Blue Foam separators: 3%
- Kevlar: 1%
- Laser lamps (univ waste): 1%
- PPE (ear plugs, 2 glasses): 1%

Landfill (true): 41%

24% Recyclable Materials
Reassess-Communicate
Nylon Glove Recycling

Maintenance Corner beside Lamp Closet (central collection)

• 14% Component Area Waste (by weight)

• 6% of Total Site Waste

• Final Assembly began the pilot program in May 2015

• All other Mechanical Areas begin collection in August 2015

• Area personnel are responsible for taking the gloves to the central collection point

100% collection for recycling = 588 lb/mo or 7,056 lb annually diverted from landfill
Reassess-Communicate

Recycle Rates: Plastic Film & Nitrile Gloves

Plastic Film Recycled

- 6,961 lb Recycled (since beginning)

- Recycling 2,000 lb of plastic:
  - Saves 5,774 kWh of energy
  - Saves 16.3 barrels (685 gal) of oil

Nitrile Gloves Recycled

- 2,835 lb Recycled (since beginning)

FY15 Waste to Landfill = 2%
Any questions?

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